ARIZONA INVASIVE SPECIES ADVISORY COUNCIL

Research and Information Management Working Group Plan Recommendations

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RESEARCH

I. Issue

Research is a critical component of the invasive species management plan for the state of Arizona. Effective prevention, detection, control, eradication and restoration all require the development, testing and refining of both existing and new technologies. Research includes both hypothesis testing, and inventory and monitoring within an adaptive management context. Coordination of research efforts among state agencies, federal resource management agencies, neighboring states and private landowners is a critical component of ensuring an integrated response on invasive species that respect no boundaries.

II. Current Status

Current research on invasive species in Arizona is largely uncoordinated and driven by the interests of individual scientists or the mandates of various agencies. It would be highly beneficial to coordinate research and monitoring to the maximum possible extent.

III. Recommended Actions

- Administrative/logistical

To facilitate the assessment of past and ongoing research efforts on invasive species in Arizona we recommend the establishment of an Arizona center for invasive to support, prioritize, and coordinate invasive species research needs in Arizona. The center would be guided by the Arizona Invasive Species Advisory Council and would have the authority to prioritize and coordinate research on invasive species as authorized. We also recommend the development of a funding source database and creation of an agency grant program along the lines of the Arizona Department of Water Resource's Water Protection Fund. One of the first steps needed to coordinate research on invasive species in Arizona is to conduct a systematic review of past and present efforts in this regard, and assemble the information into a web-based clearinghouse to allow better collaboration and sharing of information among researchers and government agencies. Such a review would not only provide an assessment of the current state of our knowledge with respect to this issue, but also would identify potential gaps in knowledge or skill.

A. Areas of Emphasis for invasive species management research needed "…to position Arizona as a leader in invasive species management…" (AZ EO 2005-09 sec. 6e(4))

The National Strategy for Invasive Plant Management identified the following research opportunities and all are applicable to Arizona and to taxa other than plants:

1. Development of new procedures to identify invasive species at ports of entry;
2. Basic ecological studies to determine what conditions make Arizona landscapes, waterways and wetlands vulnerable to invasion entry;
3. Development of risk assessments of invasive potential of new species that may enter the state entry;
4. Controlled selection of imported nonnative species to minimize introducing pest organisms;
5. Development of effective standardized monitoring protocols within various classes of Arizona's invasive organisms.
6. Economic impact assessment to demonstrate cost savings of prevention, control and eradication
7. Development of effective techniques to enhance native biodiversity and productivity on sites where restoration is feasible.
8. Development of site-specific control methods and identification of associated risks
9. Identification and evaluation of new biological and chemical controls that are safe, effective and target-specific
10. Development of eradication and control techniques for new invasive species
11. Development of methods to screen and certify that pack animal feed and wildflower/grass mixes used for revegetation are free of invasive plant seeds;

Note: the following examples of research needs are not necessarily exhaustive, although the Working Group did attempt to be comprehensive.

1. Prevention and interdiction of non-native pests, before they establish reproducing populations within Arizona are critical first responses to (1) keeping new invasive species from entering the state, (2) containing recently introduced pests within initially infested areas, and (3) investigating immediacy or likelihood of the threat posed by an invasive species so that management goals can be defined to prevent introduction of known invasive species that are not established in Arizona. Specific topics within this research domain include the following list:

- Identify invasive species that have the highest likelihood of being introduced;
- Identify pathways that have the highest likelihood of introducing invasive species;
- Identify areas currently devoid of or experiencing low levels of infestation by invasive species;
- Identify non-invasive substitutes for non-native commercial species that have been assessed as invasive;

2. Early Detection and Rapid Response is the second step of a comprehensive plan for keeping non-native species' encroachment from becoming widespread problems. Prevention and interdiction will not stop all entries of non-native organisms. Therefore, planning eradication of initial populations of new pest while they are confined to small geographic is essential. Specific topics within this research domain include the following list.

- Evaluate existing risk-analysis criteria for plants and animals and modify as necessary to serve as threat assessment protocols;
- Evaluate existing tools and develop new tools for survey and detection appropriate to each taxonomic group of concern;
- Identify high-risk areas for survey;
- Identify taxonomic-specific monitoring protocols for assessing the effectiveness of control measures following rapid response;
- Determine potential degree of economic, ecological, or health risk posed by invasive species identified by early detection – rapid response protocols;
- Establish net cost savings and environmental benefits achieved by acting immediately versus later so that effective control and management strategies can be identified for species currently extant in Arizona.

3. Control and Management research projects address invasive species that are already established (naturalized) within the state. These are species for which eradication probably is impossible;

- Identify those invasive species currently extant and widespread in Arizona;
- Develop or refine techniques for management (including eradication of small outlying populations, suppression, control, and containment) of invasive species already established in Arizona;
- Develop monitoring protocols to assess the effectiveness of management actions and potential for subsequent invasion;
- Develop inventory and monitoring protocols to determine the distribution, abundance, and rates of change of invasive species;

4. Restoration is an indirect control method that follows specific efforts to eradicate or control nonnative organisms. This activity has a goal of replacing non-native species with native plant or animal species in wildland environments, or revegetating severely or periodically disturbed sites with vegetation that excludes later movement of non-native species back into the treated area.

- Evaluate and develop appropriate techniques for restoration, including the identification of appropriate taxa to be used as restoration / revegetation materials;
- Identify best site-recovery options following invasive species removal that result in permanent restoration outcomes;

- Develop monitoring protocols to assess the effectiveness of preventing subsequent invasion after restoration or revegetation treatments.

B. Technology Transfer

One important goal of any research effort is to communicate the results. With respect to research about biological invasions, audiences include research scientists, conservation practitioners, decision-makers from myriad agencies and municipalities, the general public, and industry. Given interstate and international relationships and the importance of the world's transportation network to spread of nonnative species, relevant audiences reside in the state of Arizona as well as in other states and throughout the world. We recommend that the Arizona Invasive Species Advisory Council provide coordination and oversight for technology transfer.

INFORMATION MANAGEMENT

I. Issue
A coordinated, up-to-date information management-sharing system is a critical component of a state-level invasive species management plan. Information management is a crosscutting issue that affects multiple aspects of an invasive species management plan.

II. Current Status
Our ability to effectively manage invasive species is constrained by lack of information about ongoing efforts and information-management systems.

III. Recommended Actions are suggested below:

- Establish an Arizona center for invasive species. A comprehensive description of the current state of information management relevant to Arizona should be among the primary initial actions of this center. This description should include at least the following information: identification of extant information-management tools and databases; responsible management agency or organization; purposes, uses, and limitations, including considerations of spatial accuracy, quality assurance of data, extent (e.g., within-agency, public), legal ramifications (e.g., regulatory, trade, general information); and funding sources. The Arizona center for invasive species will be charged with identifying information management gaps in the following areas:
  - Occurrence, assessment, inventory, and monitoring information sources;
  - Funding sources—accomplished/ongoing research information sources—management, biology and control information sources.

  The center also will be charged with identifying information management opportunities in the areas of:

  - Securing operational funds;
  - Identifying partners and participants, including entities in other states and countries;
  - Evaluating extant information management systems potentially adaptable to meet Arizona information needs (e.g., Southwest Exotic Plant Information Clearinghouse [SWEPIC]);
  - Designing and initiating an Arizona information system that includes needs of all partners and participants, and where feasible include entities in other states and countries.

- The Arizona's Heritage Data Management System (HDMS), managed by Arizona Game and Fish Department (AGFD), identifies and tracks plants and animals of concern, or those with special status at the federal, tribal, or state level. We propose the Invasive Species Advisory Council identify priority invasive species to be tracked by HDMS to provide integrated information on

the status, distribution, and biology of high-priority invasive species in the state.

- Myriad state and federal agencies, non-governmental organizations, and institutions of higher education have developed databases and information-management systems. Examples include:
    1. Southwest Exotic Plant Mapping Program (SWEMP; regional invasive plant database managed by USGS; available online at: http://www.usgs.nau.edu/SWEPIC/swemp/swempa.asp).
    2. Crayfish occurrences (managed by AGFD).
    3. National Agricultural Pest Information System (regulated plants, insects, diseases, bio-control agents—occurrences mostly recorded at the county level (some global positioning system-derived locality info, presence-absence data, management status, survey information).
    4. Forest Service databases (forest insect and diseases). http://www.fs.fed.us/foresthealth/programs/invasive_species_mgmt.shtml; http://www.invasive.org/insects.cfm; http://www.invasive.org/diseases.cfm.
    5. Arizona Department of Agriculture invasive plant database (non-public).
    6. Arizona Department of Transportation (invasive plant treatment database—occurrence information provided to SWEMP).
    7. Natural Resources Conservation Service, Plant Material databases (introductions, investigations, and so on).
    8. SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: http://seinet.asu.edu/collections).
    9. PLANTS database (available online at http://plants.usda.gov)
    10. New Mexico State University website on 122 invasive species (available online at http://weeds.nmsu.edu)
    11. INVADERS database (invasive species of the Pacific Northwest; available online at: http://invader.dbs.umt.edu/).

  After thoroughly reviewing existing efforts to track invasive species, the Invasive Species Advisory Council should establish criteria for the use and construction of databases and information-management systems for the state of Arizona. We recommend full funding for maintenance and management of resulting databases. To determine the quantity and relevance of available and forthcoming research information, we propose development and implementation of a survey. The proposed survey would target organizations that conduct invasive species research that were identified from the "Survey for Agencies and Organizations with Invasive Species Management Responsibilities" previously sent to agencies and organizations. The survey will be designed to identify individuals and organizations currently conducting invasive species research, areas of research, their perception of gaps, and major funding sources. The survey will be developed and administered by the Invasive Species Advisory Council.